UNITED STATES PATENT AND TRADEMARK OFFICE

A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/608,526	06/30/2000	Shuo DI	MSI-449US	1121

22801 7590 08/18/2005

LEE & HAYES PLLC
421 W RIVERSIDE AVENUE SUITE 500
SPOKANE, WA 99201

EXAMINER	
STEVENS, THOMAS H	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 08/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/608,526	DI ET AL.	
	Examiner	Art Unit	
	Thomas H. Stevens	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-21 and 23-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-21 and 23-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-28 were previously examined.

2. Claims 5 and 22 were cancelled.

3. Claims 1-4, 6-21, 23-28 were examined.

Section I: Response to Applicants' Arguments (3rd Office Action)

101

4. Applicants are thanked for addressing this issue. Rejection is withdrawn.

103

5. Applicants are thanked for addressing this issue. Rejection is withdrawn.

Section II: Final Rejection (4th Office Action)

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. Claims 1-4, 6-21, 23-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al., (U.S. Patent 6,904,402 (2005)). (Hereinafter: Wang).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Wang discloses a method for optimizing a language model comprising an initial language model from a lexicon and segmentation derived from a received corpus (abstract).

Claim 1: A method comprising: assigning each of a plurality of segments comprising a received corpus to a node in a data structure denoting dependencies between nodes (column 8, lines 30-35); calculating a transitional probability (column 7, lines 50-52) between each of the nodes in the data structure; and managing storage of the data structure across a system memory of a computer system and an external memory of the computer system (column 8, lines 7-10) such that at least one said node is stored in the system memory and another said node is stored in the extended memory simultaneously (columns 7-8, lines 65-67 and 1-10, respectively).

Claim 2: A method according to claim 1, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively) further comprising: calculating a frequency of occurrence for each elemental item of the segment; and removing nodes of the data structure associated with items which do not meet a minimum frequency threshold for the frequency of occurrence (column 7, lines 25-29).

Claim 3: A method according to claim 2 (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 25-29) wherein the frequency of the item is calculated by counting item occurrences throughout the subset (column 9, lines 7-10) and/or corpus.

Claim 4: A method according to claim 2, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 25-29) wherein the minimum threshold is three (column 7, lines 30-31).

Claim 6: A method according to claim1, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively) wherein the step of managing storage of the data structure comprises: identifying least recently used nodes (column 8, line 8) of the data structure; and storing the least recently used nodes of the data structure in the extended memory of the computer system when the data structure is too large to store completely within the system memory (column 8, lines 7-10).

Claim 7: A method according to claim 6, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively; column 8, lines 7-10) wherein the extended memory of the computer system comprises one or more files on an accessible mass storage device (column 8, lines 52-58).

Claim 8: A method according to claim 7, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively; column 8, lines 7-10; column 8, lines 52-58) wherein the data structure represents to a language model, spread across one or more elements (column 4, lines 24-26) of a computing system memory subsystem.

Claim 9: A method according to claim 1, (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively) wherein calculating a transition probability includes calculating a Markov transitional probability between nodes (column 8, lines 24-35).

Claim 10: A storage medium (column 12, lines 25-42) comprising a plurality of executable instructions including at least a subset of which that, when executed by a processor, implement a method according to claim 1 (column 8, lines 30-35; column 7, lines 50-52; columns 7-8, lines 65-67 and 1-10, respectively).

Claim 11: A method for predicting a likelihood of an item in a corpus comprised of a plurality of items (column 6, lines 45-54), the method comprising: building a data structure, across a system memory of a computer system and an extended memory of the computer system, of corpus segments representing a dynamic context of item dependencies within the segments (column 6, lines 57-64); calculating the likelihood of each item based, at least in part, on a likelihood of preceding items within the dynamic

context (column 7, lines 18-21); iteratively re-segmenting the corpus; and predicting a likelihood of an item in the re-segmented corpus (column 12, line 62).

Claim 12: A method according to claim 11, (column 6, lines 45-54; column 7, lines 18-21; column 12, line 62) wherein the method of building a dynamic context of preceding dependent items comprises: analyzing the data structure representing the language model (column 7, lines 15-31); identifying all items with dependencies to or from the item; and a using all items with dependencies to or from the item as the dynamic context (column 7, lines 15-31).

Claim 13: A method according to claim 11, (column 6, lines 45-54; column 7, lines 18-21; column 12, line 62) wherein the language model includes frequency information for each item within the model (column 7, lines 1-9).

Claim 14: A method according to claim 13, (column 6, lines 45-54; column 7, lines 18-21; column 12, line 62; column 7, lines 1-9) wherein calculating the likelihood of the item comprises: calculating a Markov transition probability for the item based, (column 6, lines 46-50) at least in part, on the frequency of the items comprising the dynamic context (column 7, lines 18-20).

Claim 15: A method according to claim 11, (column 6, lines 45-54; column 7, lines 18-21; column 12, line 62) wherein calculating the likelihood of the item comprises:

calculating a Markov transition probability for the item given the dynamic context of items (column 6, lines 46-50; column 7, lines 18-20).

Claim 16: A storage medium (column 12, lines 25-42) having stored thereon a plurality of executable instructions including instructions which, when executed by a host computer implement a method according to claim 11(column 6, lines 45-54; column 7, lines 18-21; column 12, line 62).

Claim 17: A storage medium (column 12, lines 25-42) comprising executable instructions that are configured to generate, from a corpus, a data structure, generated by a computer system as a statistical language model , the data structure for storage across a system memory and an extended memory, (columns 7-8, lines 65-67 and 1-10, respectively) the data structure including: one or more root nodes; and a plurality of subordinate nodes, ultimately linked to a root node, cumulatively comprising one or more sub-trees, wherein each node of a to sub-tree represents (column 8, lines 25-30 with figure 3) one or more items of a corpus and includes a measure of a Markov transition probability between the node and another linked node (column 7, lines 10-30).

Claim 18: A storage medium (column 12, lines 25-42) data (column 12, lines 25-42) structure according to claim 17(column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30) wherein the root node represents a common

root item for all subordinate nodes in the one or more sub-trees (column 8, lines 25-30 with figure 3).

Claim 19: A storage medium (column 12, lines 25-42) data (column 12, lines 25-42) structure according to claim 17 (column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30) wherein the Markov is transition probability is a measure of the likelihood of a transition from one node to another node based, at least in part, on the one or more items represented by each of the nodes (column 8, lines 25-30 with figure 3).

Claim 20: A storage medium (column 12, lines 25-42) data (column 12, lines 25-42) structure according to claim 17, (column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30) wherein the items include one or more of a character, a letter, a number, and combinations thereof.

Claim 21: A storage medium (column 12, lines 25-42) data (column 12, lines 25-42) structure according to claim 17, (column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30) wherein the data structure represents a dynamic order Markov model (DOMM) language model of the textual source (column 6, lines 45-64).

Claim 22: A storage medium (column 12, lines 25-42) storage medium (column 12, lines 25-42) comprising a plurality of executable instructions which, when executed by a processor, implement a data structure according to claim 17 (column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30).

Claim 23: A computer system having the storage medium (column 12, lines 25-42) and processor confined to interpret the computer executable instructions according to claim 17 (column 12, lines 25-42; columns 7-8, lines 65-67 and 1-10, respectively; column 7, lines 10-30).

Claim 24: A modeling agent comprising: a controller, to receive a corpus (abstract); and a data structure generator, (column 6, lines 35-40) responsive to and selectively invoked by the controller, to assign each of a plurality of segments comprising the received corpus to a node in a data structure denoting dependencies between nodes (columns 5-6, lines 64-67 and 1-12); wherein the modeling agent calculates a transitional probability between each of the nodes of the data structure (column 7, lines 50-52) to determine a predictive capability of a language model represented by the data structure and iteratively re-segments the received corpus until a threshold predictive capability is reached (abstract).

Claim 25: A modeling agent according to claim 24, (columns 5-6, lines 64-67 and 1-12; column 7, lines 50-52; abstract) the data structure generator comprising: a dynamic

segmentation function, to iteratively re-segment (column 12, line 62) the received corpus to improve language model predictive capability.

Claim 26: A modeling agent according to claim 24, (columns 5-6, lines 64-67 and 1-12; column 7, lines 50-52; abstract) the data structure generator comprising: a frequency analysis function to analyze a frequency of occurrence of segments within the corpus (column 7, lines 1-9).

Claim 27: A modeling agent according to claim 26, (columns 5-6, lines 64-67 and 1-12; column 7, lines 50-52; abstract; column 7, lines 1-9) wherein segments that do not meet a frequency of occurrence threshold are removed from the data structure, (column 7, lines 25-29) reducing data structure size and improving language model predictive capability.

Claim 28: A storage medium (column 12, lines 25-42) comprising a plurality of executable instructions including at least a subset of which, when executed, implement a language modeling agent to assign each of a plurality of segments of a received corpus to a nodes in a data structure denoting dependencies between nodes, and to calculate a transitional probability (column 7, lines 48-49) between each of the nodes in the data structure to determine a predictive capability of a language model denoted by the data structure, wherein the modeling agent dynamically re-segments (column 12, line 62) the received corpus to remove segments which do not meet a minimum

frequency threshold to improve one or more language model performance attributes (column 12, lines 50-67).

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is 571-272-3715, Monday-Friday (8:00 am- 4:30 pm) or contact Supervisor Mr. Leo Picard at (571) 272-3749. Central Fax number is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

August 8, 2005

THS

LEO PICARD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100